Armed Forces College of Medicine

AFCM

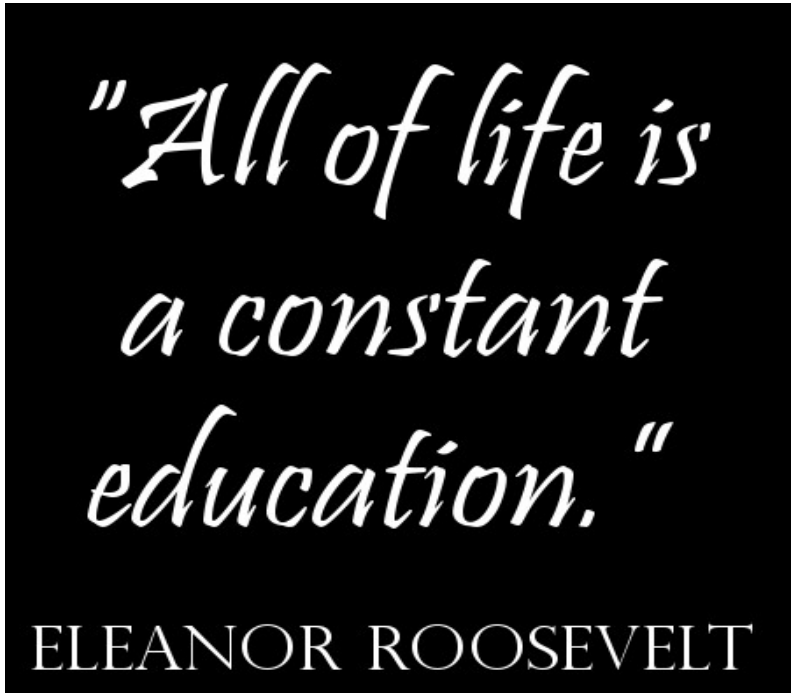
Cardiopulmonary module

Clinical Integrated Cases

Session 1

Basic Science Principles for Clinical Reasoning

1- Critical thinking
2- Introduction to common forms of disease
3- Apply basic knowledge in a realistic clinical scenario.
4- Interpersonal skills-(share and apply your knowledge)… communication…patient safety
5- Life long self-directed learning



Case co-ordinators

Prof. Drs. Manal Hassan, Tamer, Bassant, Lamiaa

Sharing departments

- Anatomy department
- Cardiology department
- Histology department
- Microbiology department
- Pathology department
- Physiology department

Case: Dyspnea on exertion

Dyspnea on exertion

Soad is a 32-year-old woman, She is a housewife living in elmarg. She is married and has one child. She presented to the clinic with dyspnea on moderate exertion for several months, with worsening in the last month.

The patient mentioned that recently she cannot sleep using one pillow and has to use 3 pillows

Past History

Soad has a history of anaemia attributed to menorrhagias

She suffered several episodes of tonsillitis and fleeting arthritis during her childhood.

The physician decided to refer Soad to the cardiology department.

List differential diagnosis of Dyspnea in Soad

What is meant by dyspnea on lying flat?

1- Cardiac dyspnea.(why)

2- Anemia related to chronic blood loss.

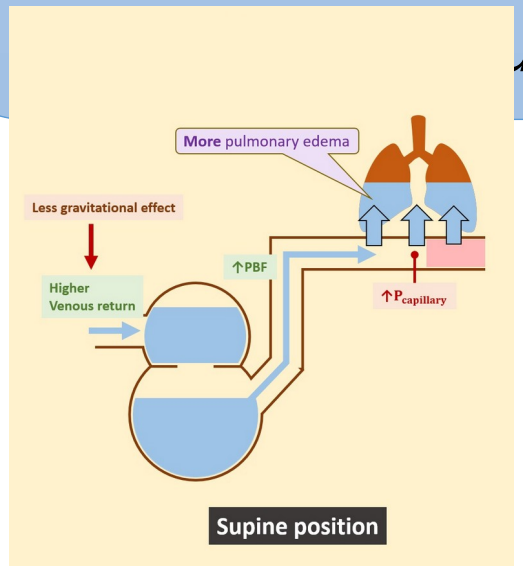
3- others, less likely

1- Explain the Mechanism of dyspnea on lying flat (orthopnea) in Soad

Mechanism of orthopnea

Congested Pulmonary Circulation

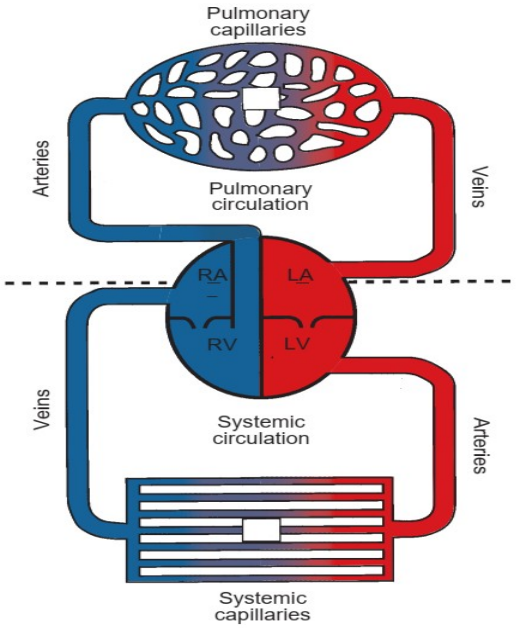
Lying flat decreases the inhibitory effect of gravity on the venous return to the heart from the lower extremities ***increases the right sided venous return*** *and to the* *ung*



Valvular disease, such as ***mitral stenosis***, can also cause blood to back up into the left atrium and lungs.

Increased pulmonary venous & capillary hydrostatic pressure

Pulmonary interstitial



2- What is the importance of history of tonsillitis and fleeting arthritis in this patient?

In the pathogenesis of rheumatic heart disease

It occurs 2-3 weeks after **streptococcal pyogenes** infections.

Pathogenesis:

- Streptococcal M proteins are heterophil with cardiac muscles.
- Antibodies formed against streptococcal antigen will cross react with antigens in cardiac muscles resulting in tissue damage **(type II**

Repeated attacks of ***Strept. pyogenes*** infection add to cardiac damage and increase severity of disease.

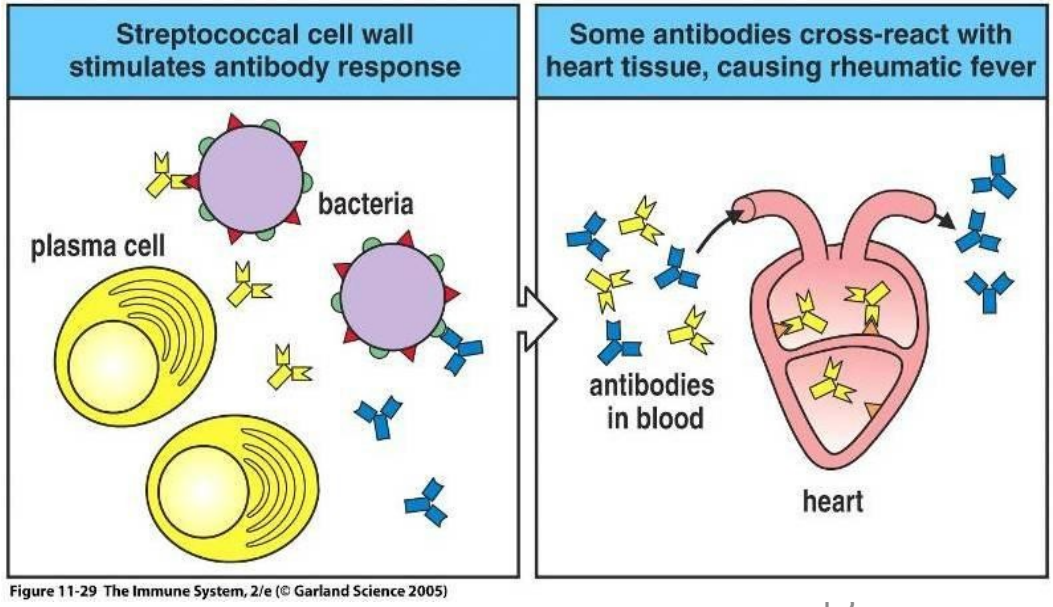


Figure 11-29 The Immune System, 2/e (© Garland Science 2005)

Welcome Back

Dyspnea on exertion

Physical examination revealed:

Pulse: 110 b/min, regular and equal on both sides
Blood pressure: 120/80 mmHg
Respiratory rate: 22 cycle/min
Temperature: 37°C

Pale skin and mucous membranes.
No cyanosis, no jaundice
No stigmata of hyperlipidemia

Neck veins: slightly above normal
Nails: pale, **no clubbing**

Dyspnea on exertion

Cardiac examination

Palpation of the **apex** showed **normal position** of the apex and **diastolic thrill**.

Cardiac auscultation revealed:

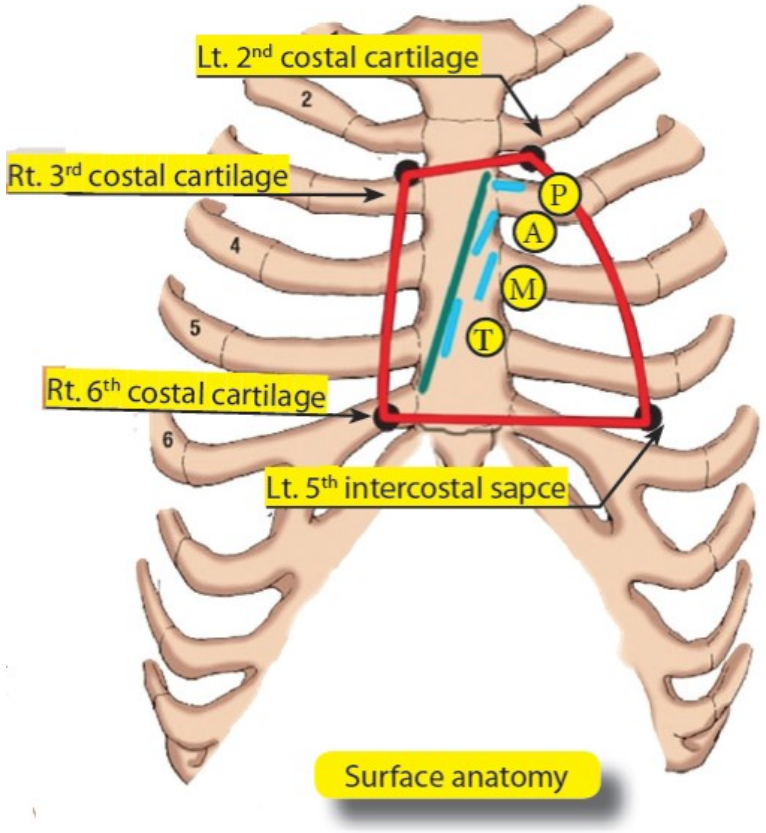
-**Accentuated S1**, normal S2

- **Diastolic murmur** at the cardiac apex, best heard with the patient in a left lateral decubitus position

3- Where should the physician put his hand to examine the apex?

Surface Markings of the Heart

- The outline of the heart can be traced on the anterior surface of the thorax by locating 4 points on the anterior thoracic wall:
- **Point (a):** At the lower border of the 2nd left costal cartilage about 1.25 cm from the sternal margin.
- **Point (b):** At the upper border of the 3rd right costal cartilage1.25 cm from the sternal margin.
- **Point (c):** At the lower border of the 6th right costal cartilage 1.25 cm from the sternal margin.
- **Point (d):** The apex of the heart is at the 5th left intercostal space 9 cm from the median plane.



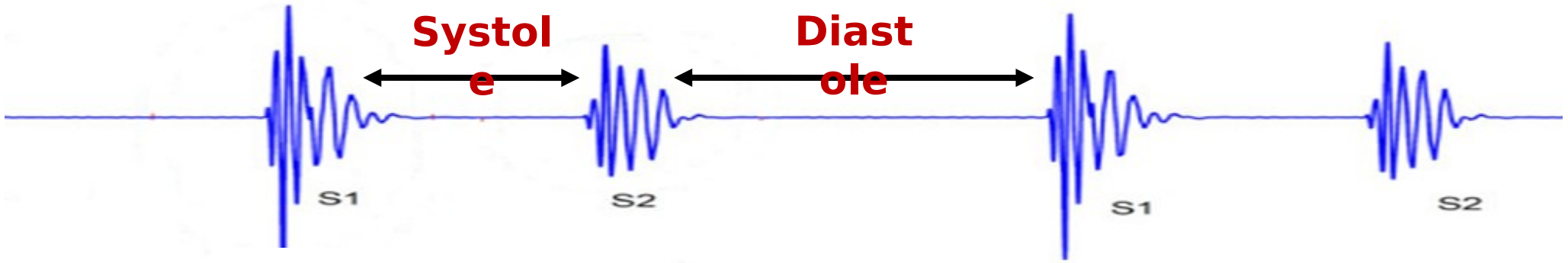
Cardiac examination of Soad revealed:

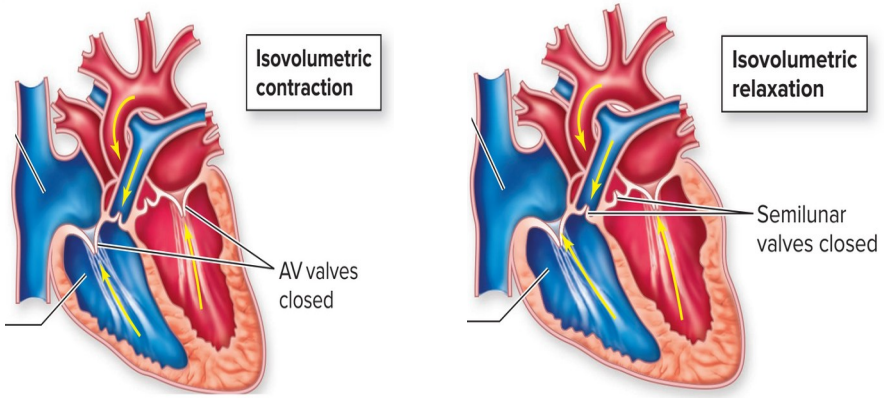
Accentuated S1, normal S2

- **Diastolic murmur** at the cardiac apex, best heard with the patient in a left lateral decubitus position.

4- Explain the cause of S1 and S2 sounds

S2	S1	
Vibration set up by Closure of semilunar valves (Aortic and Pulmonary valves)	Vibration set up by Closure of A-V valves (Mitral and Tricuspid valves)	Cause
Onset of ventricular diastole	Onset of ventricular systole	Time
Allover but best heard over the Aortic and Pulmonary areas	Allover but best heard over the Mitra and Tricuspid areas	Site of hearing



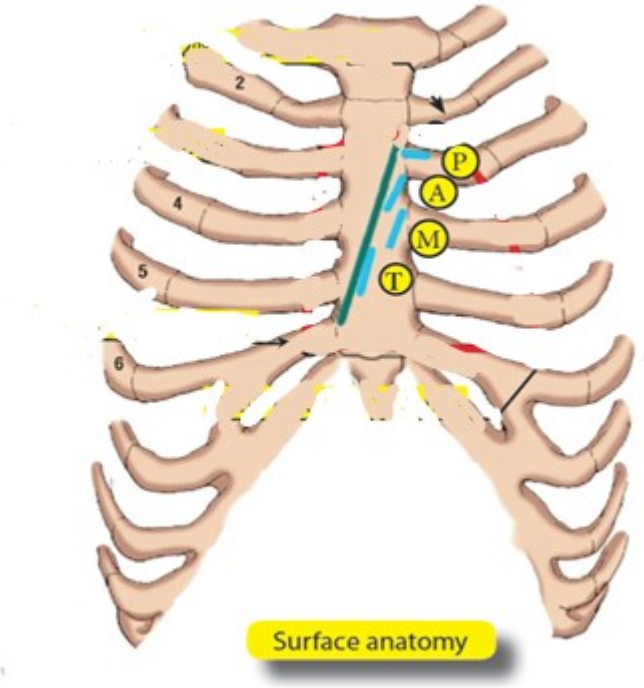


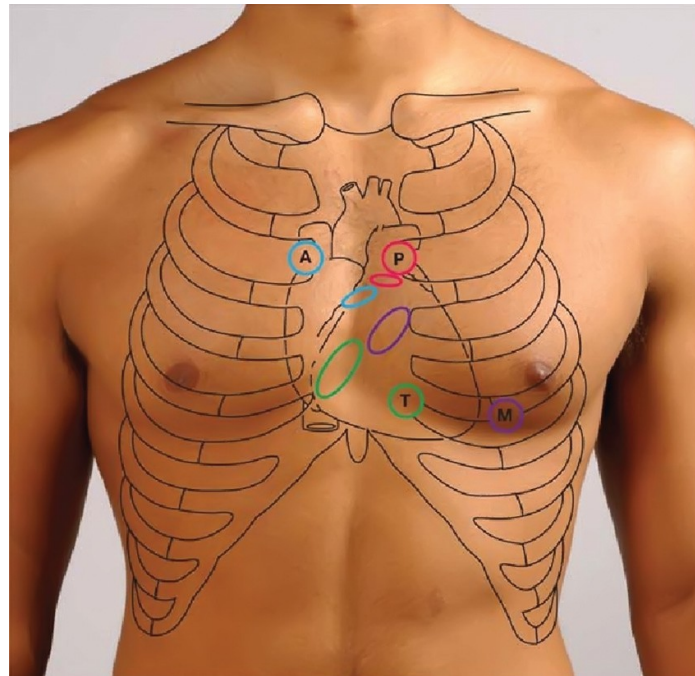
5 a. What is the surface anatomy of the valves?

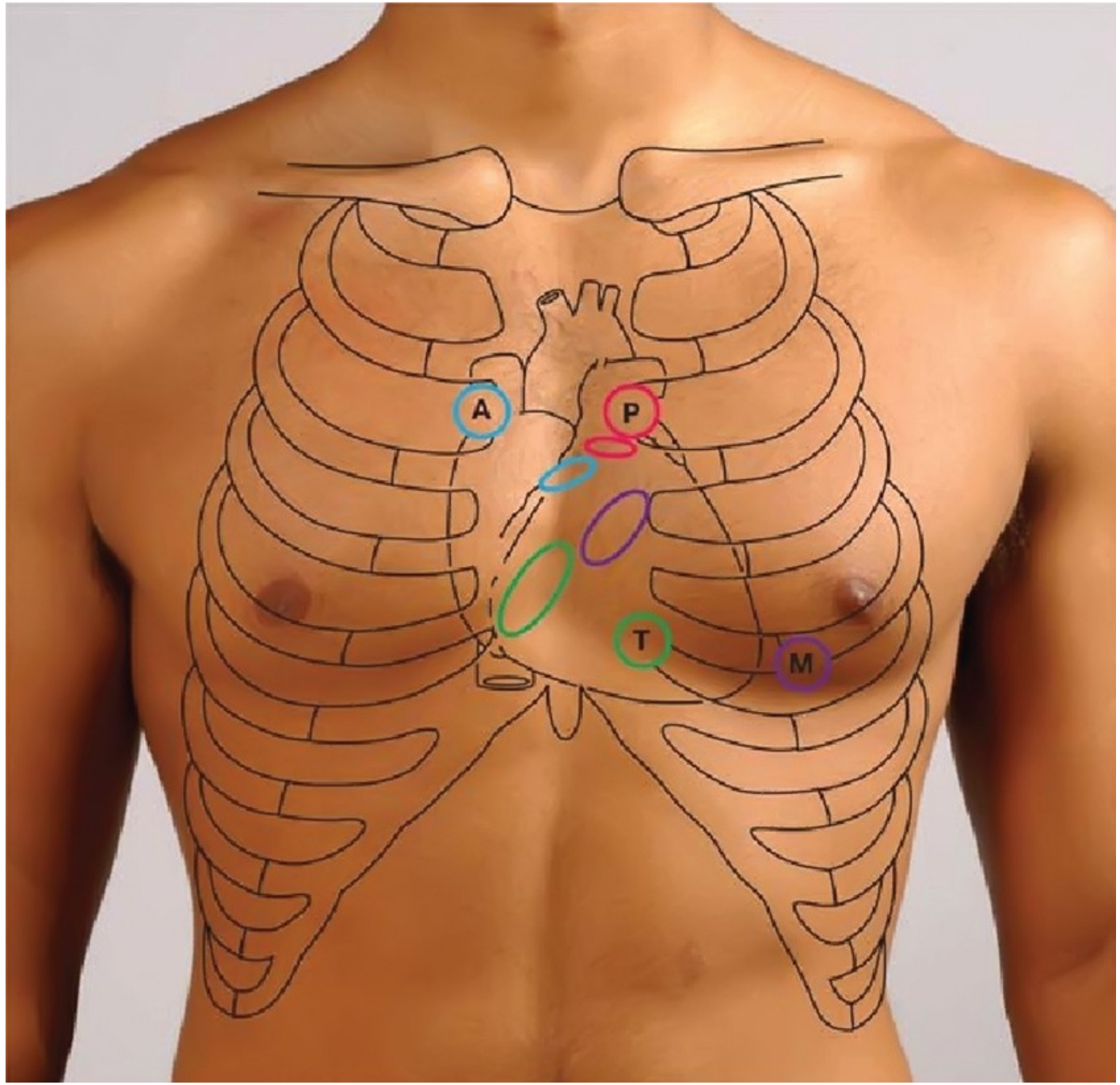
b. Where can we auscultate the valves?

Surface anatomy of valves of the h and their auscultatory areas

Valve	Surface marking	**Auscultatory area**
Pulmonary	Behind **3rd left costal cartilage** and adjacent part of the sternum	The medial end of the 2nd left intercostal space.
Aortic	Behind the left margin of the sternum opposite **the 3rd left intercostal space**	The medial end of the 2nd right intercostal space.
Mitral	Behind the left ½ of the sternum opposite the **4th left costal cartilage**.	Over the apex beat.
Tricuspid	Behind the middle of the sternum opposite the **4th intercostal space**.	Over the left ½ of the lower end of the body of






A
P
T
M

Diastolic murmur at the cardiac apex, best heard with the patient in a left lateral decubitus position.

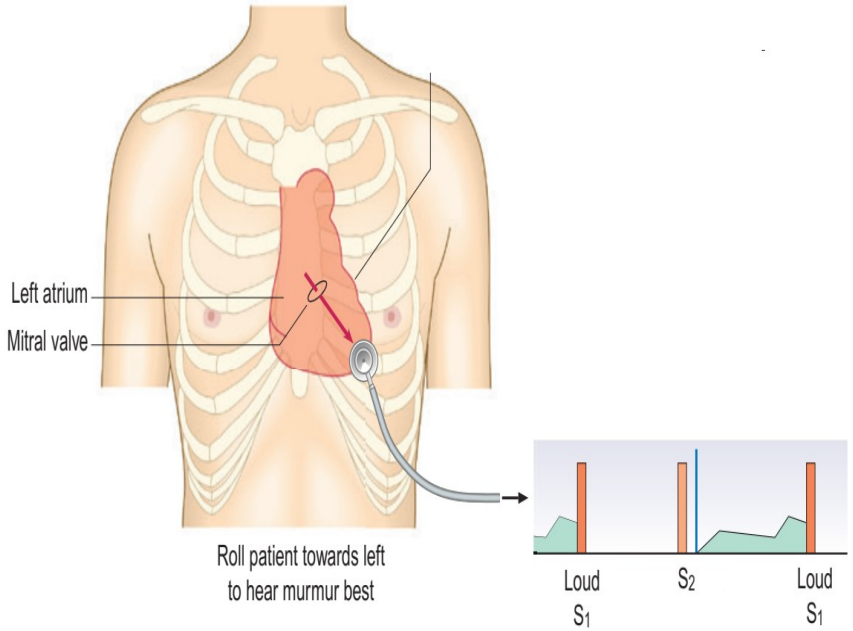
6- Which valve lesion is indicated by the apical diastolic murmur heard at the apex in Soad?

Apical diastolic murmur

Mitral Valve **Stenosis**

Mitral valve: The diastolic murmur of mitral stenosis is

- of low pitch
- rumbling in character
- best heard at the apex with the patient in the left lateral position
- the duration of the murmur correlates with the severity of the stenosis



What is your provisional diagnosis?

Justify

Items of diagnosis:

Etiological, anatomical, pathological , complications

7- What are the investigations you suggest to confirm your diagnosis and assess the case of Soad?

- **Echocardiography**
- **Chest x-ray**
- **ECG**
- **CBC**

NB : if acute RF what would be the added investigations?

ESR, CRP.

Welcome Back

Dyspnea on exertion

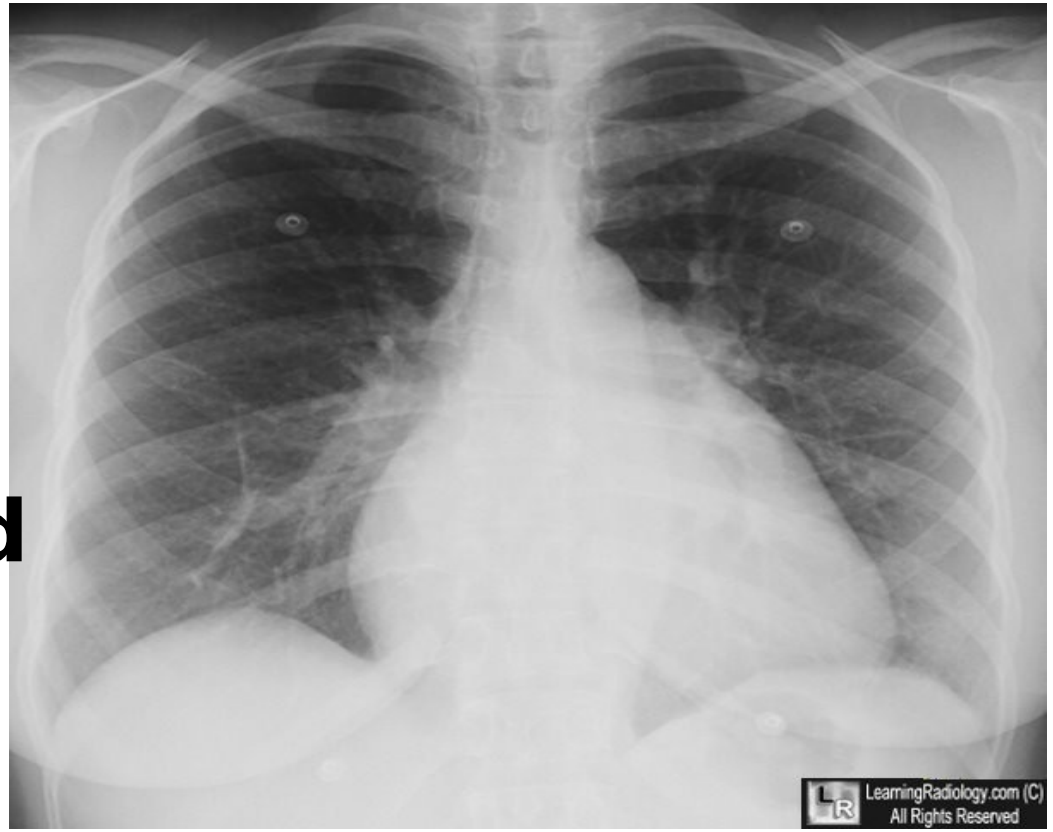
The physician asked for the following investigations:

- **12 lead ECG**
- **Chest x-ray**
- **Echocardiography**
- **ESR**
- **CRP**
- **CBC, iron profile**

Dyspnea on exertion

Results showed

Chest x-ray showed

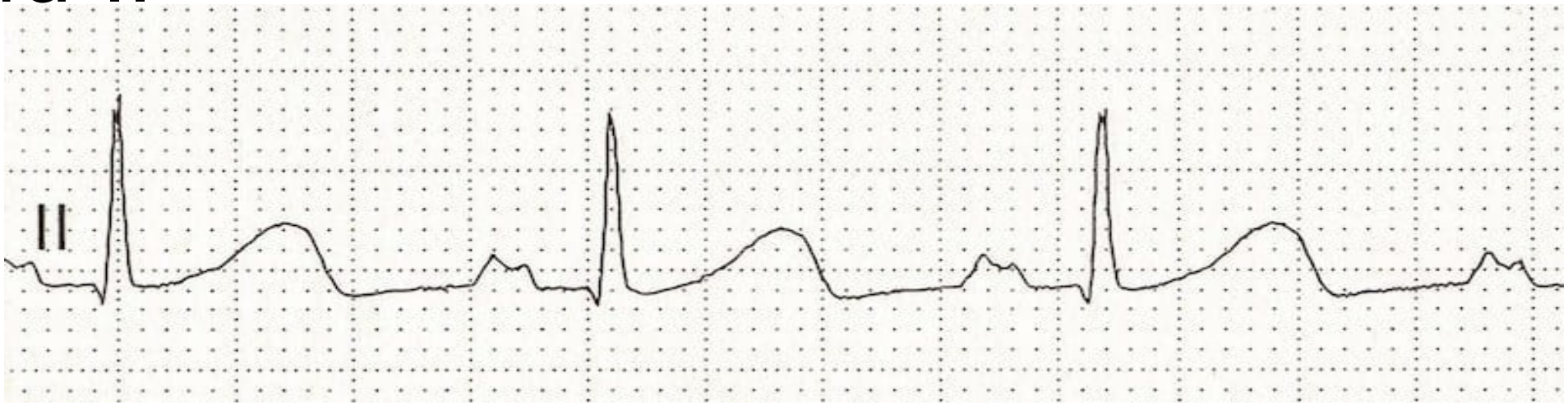


CBC and iron profile showed **microcytic hypochromic anemia**

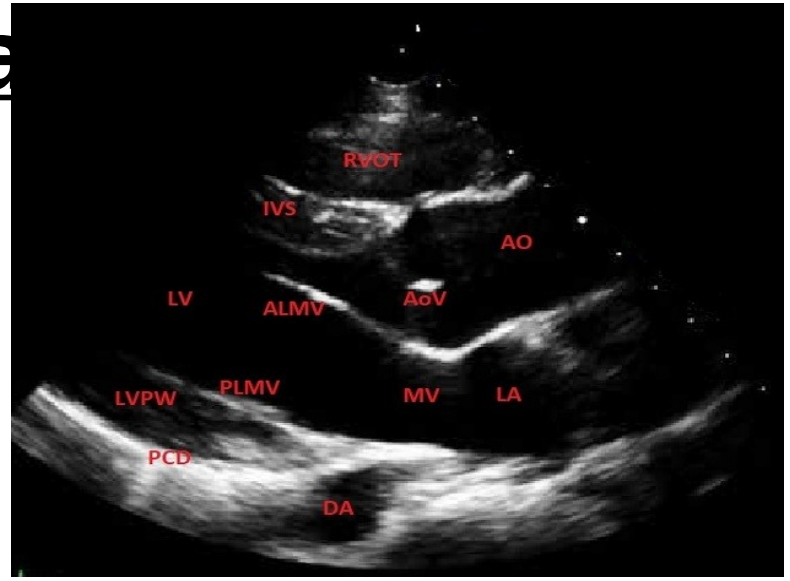
ESR and CRP showed no changes

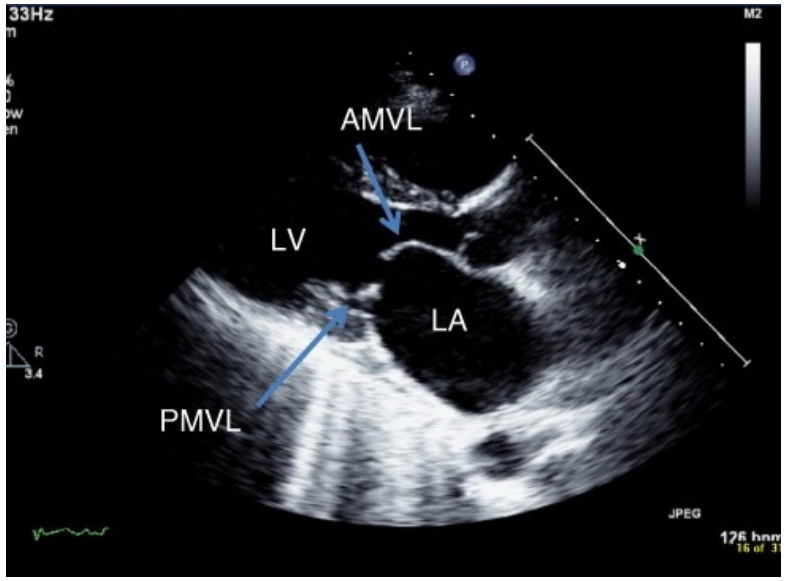
Dyspnea on mild exertion

ECG: lead II showed



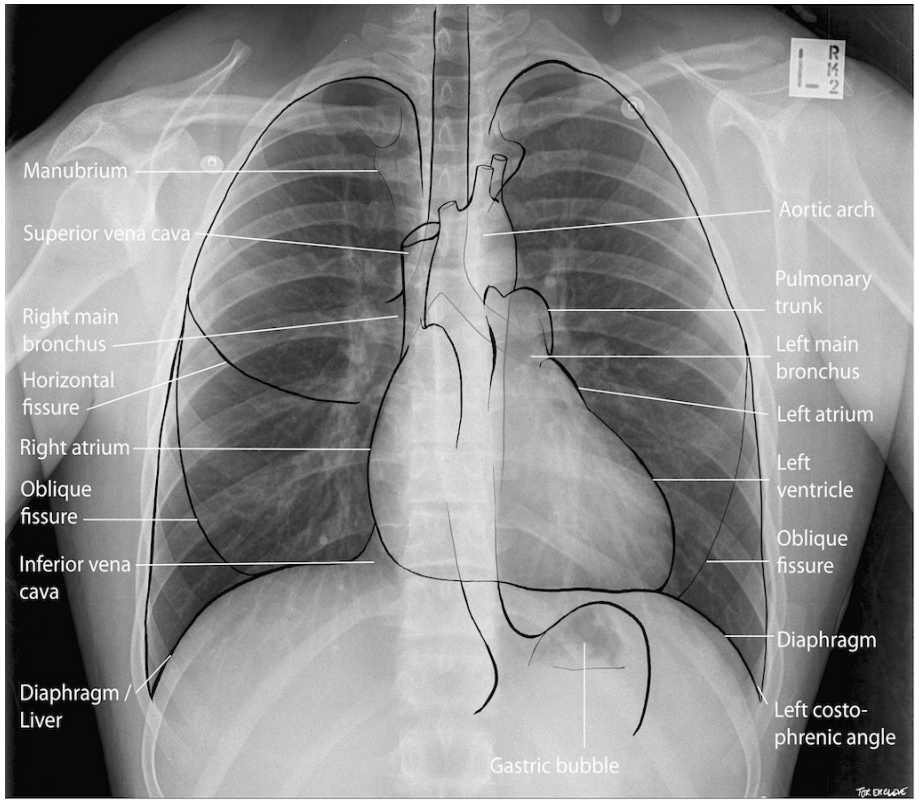
Echocardiography, revealed **mitral va**

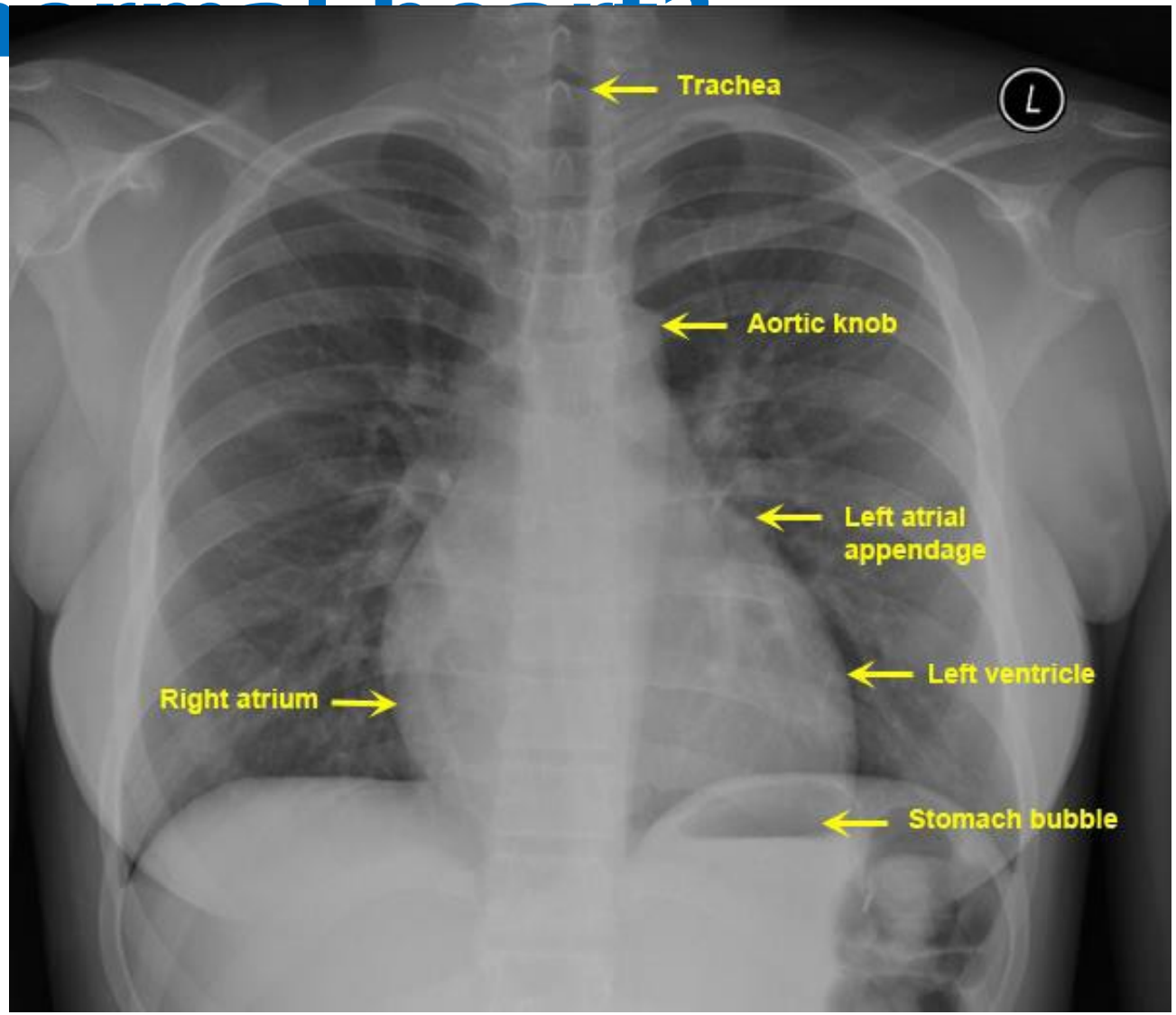


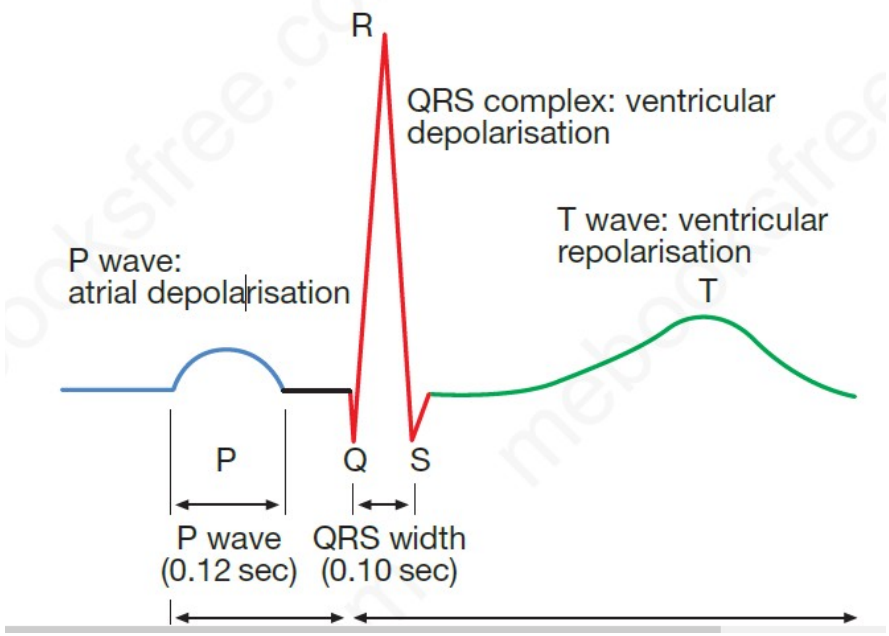


Discussion

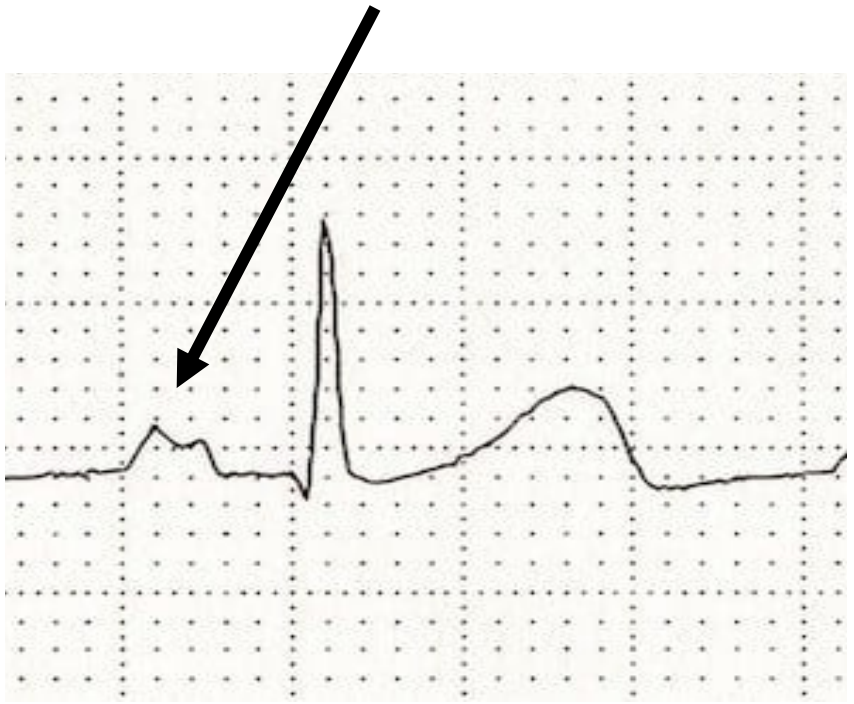
What are the findings in chest x rays concerning the normal heart?







Normal ECG



Soad ECG

Mention the difference

What is the microscopic structure of the mitral valve?

Valves of the heart

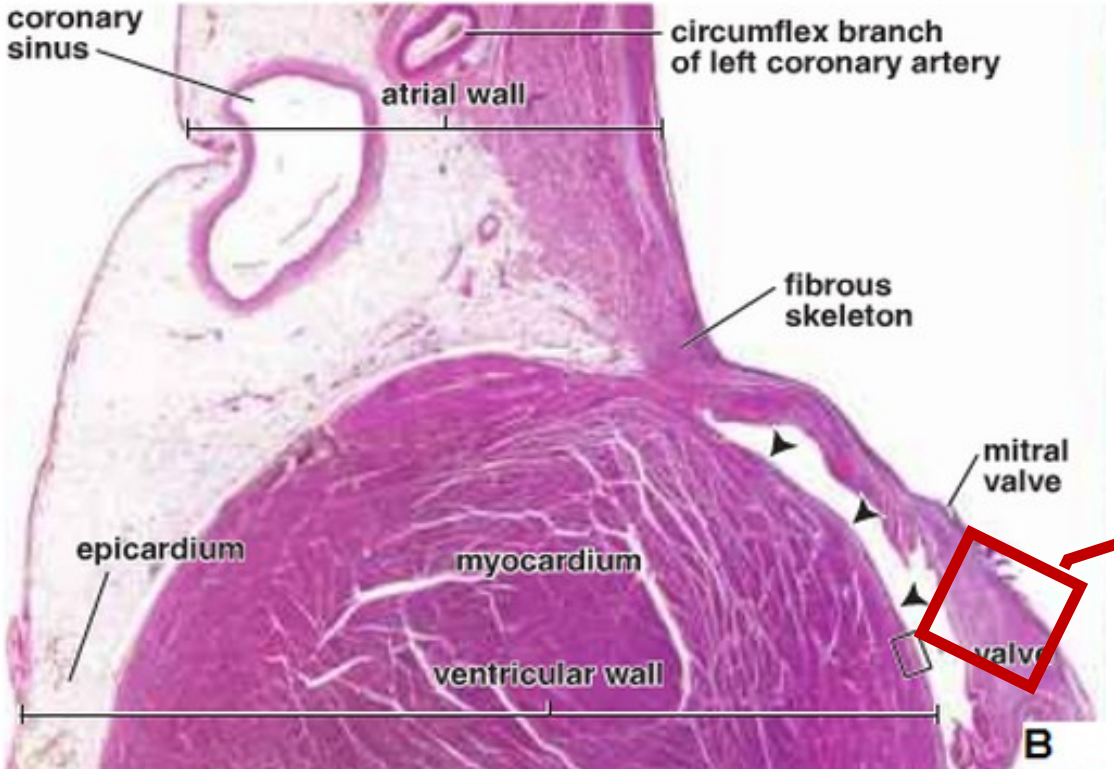
Valves are avascular

They are extension fold from endocardium ie. covered by endothelial cells on both sides,

1. **Fibrosa:** core of the valve and contains fibrous extensions from the dense irregular tissue
2. **Spongiosa:** loose connective tissue located on the atrial or blood vessel side of each valve.

It is composed of loosely arranged collagen and elastic fibers infiltrated with large numbers of proteoglycans. (**shock absorbant**)

3. **Ventricularis**



8- What are the pathological changes that occurred in the mitral valve of Soad?

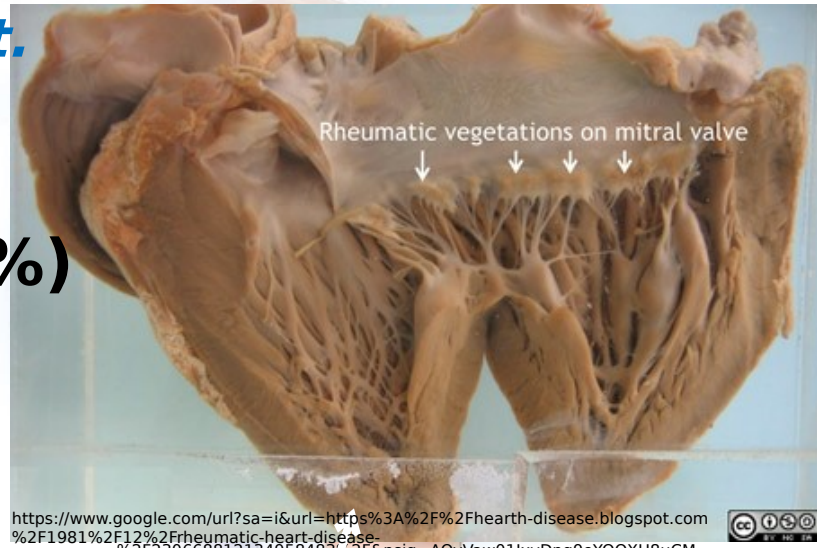
Explain their pathogenesis.

Rheumatic valvulitis

Pathological reaction: I.C. Rheumatic endocarditis: cont.

I.C.ii: Valvular endocarditis:

(Mitral alone 75%, mitral & aortic 25%)



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- **Acute rheumatic valvulitis:**
- **Cusps:** swollen (inflammation, edema)
- **Vegetations (thrombi):** formed of platelets + fibrin

Site: **- Along the line of cusp closure (due to endothelial damage) i.e. atrial surface of mitral & tricuspid valves, ventricular surface of aortic & pulmonary valves.**

http://learningradiology.com/lectures/cardiaclectures/Heart%20Inside%20and%20Out-2012/data/images/img32.jpg

- **Multiple, small, gray lesions, firmly adherent to the**

Rheumatic valvulitis

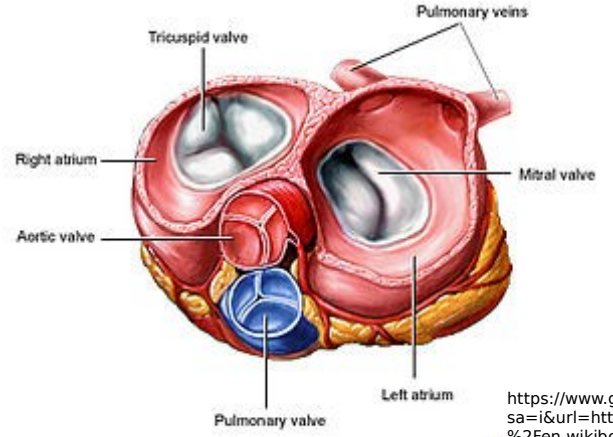
Pathological reaction: *Cont.*

I.C. Rheumatic endocarditis:

I.C.ii: Valvular endocarditis:

- **Chronic rheumatic valvulitis:**

Organization & fibrosis → the cusps appear fibrotic, thick, irregular with calcified patches → stenosis *(fish mouth),* incompetence or double valve lesion



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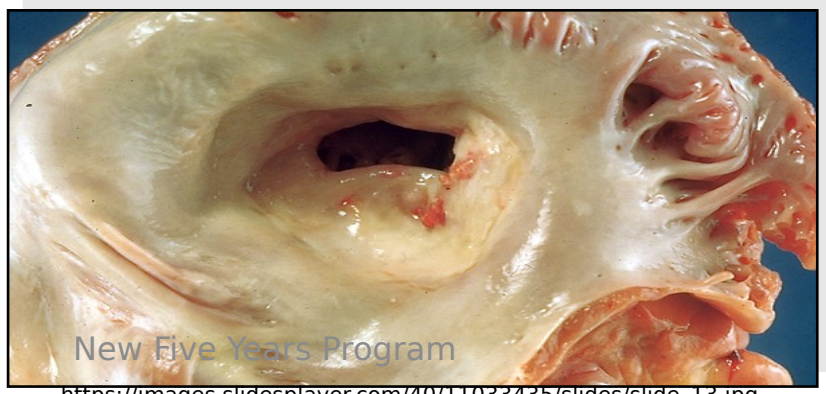

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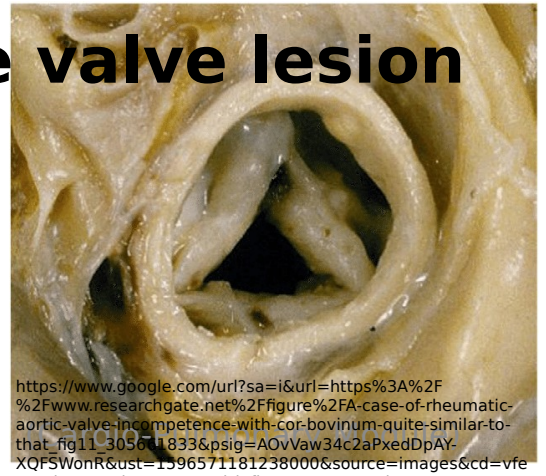

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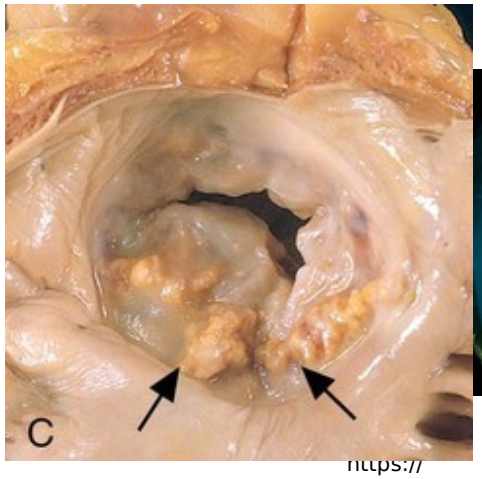

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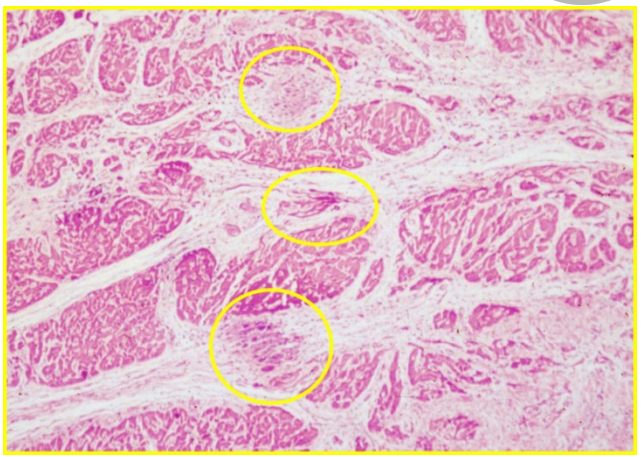
What are the other pathological changes that may have occurred in Soad’s heart?

Rheumatic fever

Pathological reaction: *Cont.*

I.A. Rheumatic myocarditis:

- ***Acute phase:***
  - **Aschoff bodies in the interstitium of the myocardium →**
  - **Rarely sever → fulminant myocarditis**
    Acute heart failure & death.
  - **Myocardium near Aschoff bodies: edema & inflammation**
- ***Chronic phase:*** **Myocardial fibrosis develops over years**



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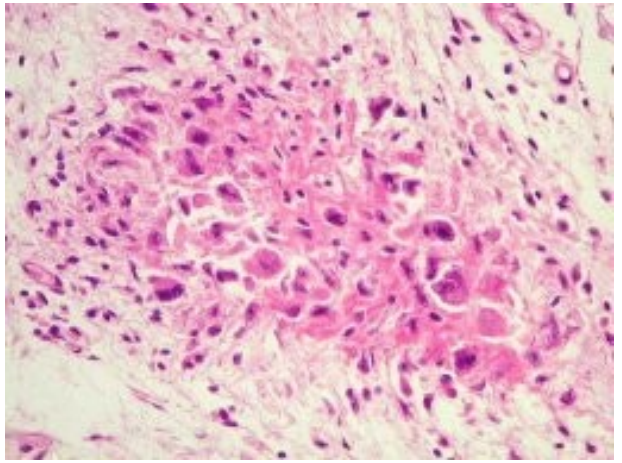

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Rheumatic fever

Pathological reaction: *Cont.*

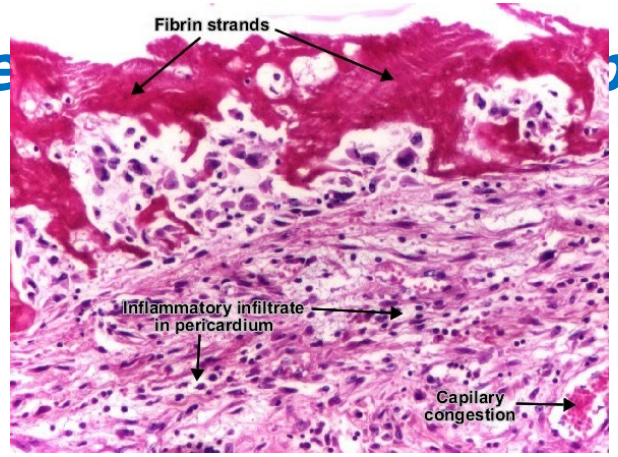
I.B. Rheumatic pericarditis:

Acute phase: ***serofibrinous pericarditis***

Fibrin threads are deposited between visceral & pari

layers

Bre ***opearanc*** **ic)**



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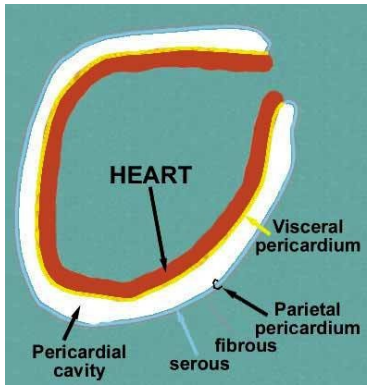
http://www.brown.edu/Courses/Digital_Path/systemic_path/cardio/CV85.jpg

Rheumatic fever

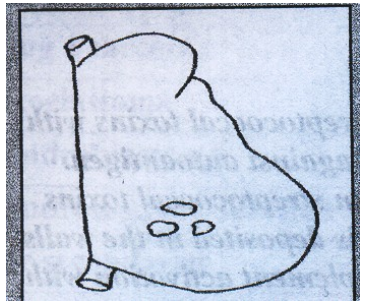
Pathological reaction: *Cont.*

I.B. Rheumatic pericarditis:

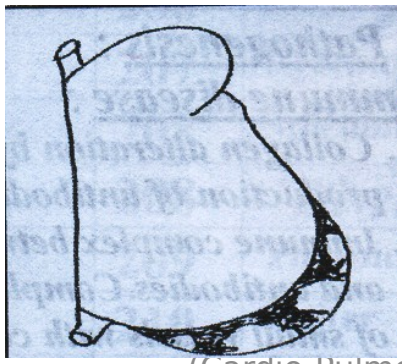
Chronic phase: **Fibrosis results in**



White patches of fibrosis on the heart surface *(milk patches)*



Adhesions between both layers of pericardium



Adhesions of pericardium & mediastinum *(adherent mediastino-pericarditis)*

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Rheumatic fever

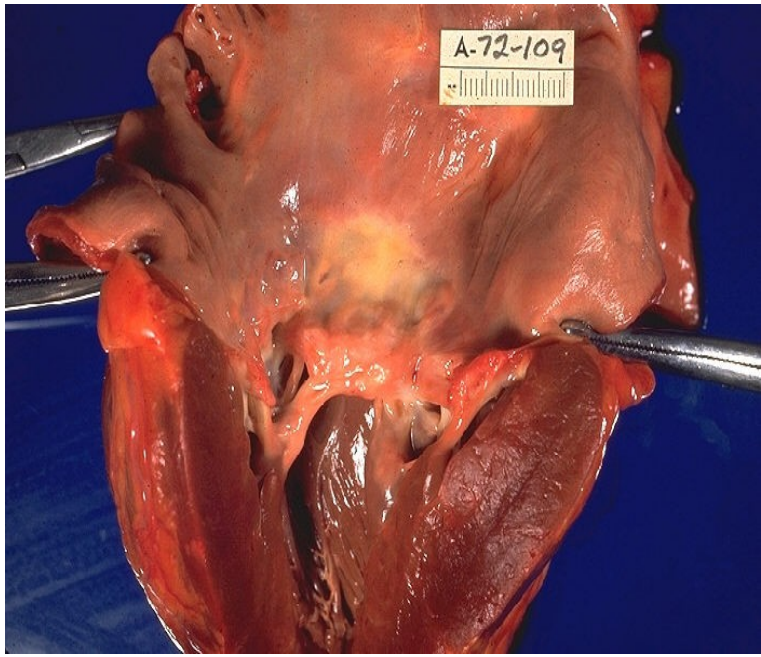
Pathological reaction: *Cont.*

I.C. Rheumatic endocarditis:

Lt. side is more commonly affected.

I.C.i: Mural endocarditis:

- ***Acute phase:*** **Aschoff bodies in the mural endocardium lining of the posterior wall of Lt. atrium**
- ***Chronic phase:*** **white fibrous patch of posterior wall of Lt. atrium *(MacCallum's patch)* due to healing of Aschoff bodies**



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Outline management plan of Soad?

- Treat anemia as it will worsen the general condition.
- Treat lung congestion.
- Prevent recurrent attacks of RF.
- Prevent occurrence of IE.
- Refer to cardiac surgeon if indicated.

9- What are the complications that can occur to Soad if she is left untreated?

Complications of rheumatic fever

1) **Ischemic manifestations.**
2) **Heart failure: Due to: -fulminant myocarditis (in acute phase),**

-valvular lesions & pericardial adhesions (in chronic phase)

3) **Increased risk of subacute bacterial endocarditis.**
4) **Valve deformity: stenosis or incompetence or double valve**
5) **Tight mitral stenosis atrial fibrillation Lt. atrial mural thrombosis thromboembolism**

Thank
you